

In the Claims:

1. (Cancelled)

2. (Currently amended) A method of segmenting a media signal for parallel watermarking operations, the method comprising:

sub-dividing the media signal into parts representing different perceptual portions within the signal, including specifying the locations of parts to be embedded with corresponding digital watermark messages and providing data used to control embedding of the corresponding digital watermarking messages in the parts;

distributing the specified parts to parallel processors after the specifying of the locations of the parts to be embedded with corresponding digital watermark messages; and

performing parallel digital watermark operations on the specified parts in the parallel processors according to the data used to control the embedding.

3. (Cancelled)

4. (Currently amended) A method of segmenting a media signal for parallel watermarking operations, the method comprising:

sub-dividing the media signal into segments based on analysis of the media signal to identify parts of media signal having signal characteristics that are more likely to carry a readable watermark signal;

analyzing the media signal to prioritize the segments of the media signal for digital watermark operations on the segments wherein the media signal segments are prioritized for digital watermark embedding operations and wherein the media signal segments are prioritized such that segments that are more likely to carry a readable watermark signal are given higher priority for the embedding operations;

distributing the prioritized segments to parallel processors; and

performing parallel digital watermark embedding operations on the prioritized segments in the parallel processors according to priority order of the prioritized segments.

5. (Withdrawn) The method of claim 2 wherein the media signal segments are segmented and prioritized by color.

6. (Withdrawn) The method of claim 2 wherein the media signal segments are prioritized for watermark embedding based on analysis of the media signal that indicates the printing distortion expected for the segments.

7. (Withdrawn) The method of claim 2 wherein the media signal segments are prioritized for watermark embedding based on likelihood of watermark survival through rendering, compression or transmission distortion.

8. (Withdrawn) The method of claim 7 wherein the watermark embedding is limited to a predetermined resource constraint limiting amount of watermark embedding before transmission, rendering or broadcast of the watermarked media signal generated by the watermark embedding.

9. (Withdrawn) The method of claim 1 wherein the media signal is segmented spatially into contiguous blocks for parallel watermark operations.

10. (Withdrawn) The method of claim 1 wherein the media signal is segmented into plural different resolution signal segments, and parallel watermark operations are performed on the plural different segments.

11. (Withdrawn) The method of claim 1 wherein the media signal is segmented based on processing bandwidth available for the watermark operations.

12. (Withdrawn) The method of claim 1 wherein the media signal is segmented and prioritized for watermark operations based on a mask used to control the watermark operations.

13. (Withdrawn) The method of claim 12 wherein the media signal comprises an image and the segments are prioritized for watermark embedding or decoding based on a color component mask.

14. (Currently amended) A method of segmenting a media signal for parallel watermarking operations, the method comprising:

sub-dividing the media signal into segments representing different perceptual portions within the signal;

distributing the segments to parallel processors; and

performing parallel digital watermark operations on the segments in the parallel processors wherein the media object is segmented into blocks based on a memory parameter of processing hardware and the parallel digital watermarking operations are performed in priority order on the blocks based on an analysis of signal characteristics of the blocks [~~a memory parameter of processing hardware~~].

15. (Original) The method of claim 14 wherein the memory parameter comprises a unit of memory used to swap data into system memory in a virtual memory system.

16. (Original) The method of claim 14 wherein the memory parameter comprises a memory alignment boundary.

17. (Previously presented) A method of segmenting a media signal for parallel watermarking operations, the method comprising:

sub-dividing the media signal into segments;

distributing the segments to parallel processors; and

performing parallel digital watermark operations on the segments in the parallel processors wherein the media signal is segmented by bit planes and the bit planes are prioritized for watermarking operations in priority order to reduce the number of bit planes of the media signal subjected to watermarking operations.

18. (Currently amended) A method of segmenting a media signal for parallel watermarking operations, the method comprising:

- sub-dividing the media signal into segments;
- distributing the segments to parallel processors; and
- performing parallel digital watermark operations on the segments in the parallel processors wherein the media signal is segmented based on probability of watermark detection and prioritized for parallel watermark decoding operations[~~-, both~~] based on probability of watermark detection.

19. (Previously presented) The method of claim 18 wherein the parallel processors comprise threads of execution on one or more hardware processing units.

20. (Currently amended) A method of segmenting a media signal for parallel watermarking operations, the method comprising:

- sub-dividing the media signal into segments;
- distributing the segments to parallel processors; and
- performing parallel digital watermark operations on the segments in the parallel processors wherein the watermark operations are performed by two or more watermark operation modules that perform a different watermark function, and the watermark operation modules operate in parallel such that a watermarking task for the media signal is distributed over the watermark operation modules performing different watermark functions on the media signal in parallel, wherein the different watermark functions are performed in parallel by a watermark generator that generates a signal to be embedded and a perceptual analyzer that analyzes the media signal to generate signal dependent parameters used to control embedding of the signal in the media signal; wherein the watermark generator generates the signal to be embedded for a first segment on a first processor, and the perceptual analyzer generates the signal dependent parameters for the first segment on a second processor.

21. (Original) The method of claim 20 wherein the watermark operation modules comprise a watermark generator, a perceptual analyzer and a watermark applicator.

22. (Previously presented) A computer readable medium on which is stored instructions for performing the method of claim 20.

23. (Currently amended) A distributed digital watermark embedder comprising:
a watermark signal generator for generating a watermark from a message;
a perceptual analyzer for perceptually analyzing a media signal and generating perceptual control parameters used to control application of the watermark to the media signal; and
a watermark applicator for receiving the media signal, the watermark and the perceptual control parameters, and for applying the watermark to the media signal according to the perceptual control parameters; wherein the watermark signal generator, the perceptual analyzer and the watermark applicator operate on distributed processors; wherein variable watermarks are embedded in copies of a media signal by executing the perceptual analyzer on the media signal once to generate a perceptual mask that is dependent on and automatically computed from the content of the media signal and is re-used by the watermark applicator to apply different watermarks from the watermark signal generator to the copies, the perceptual mask specifying areas of the media signal and is used to control embedding of the watermark in the areas.

24. (Original) The embedder of claim 23 wherein the distributed processors comprises independent threads of execution.

25. Cancelled

26. (Original) The embedder of claim 23 including a media signal segmentation processor for sub-dividing a media signal into segments for parallel processing in the embedder.

27. (Original) The embedder of claim 26 wherein the embedder includes plural perceptual analyzers, which operate in parallel on segments of the media signal.

28. (Original) The embedder of claim 26 wherein the embedder includes plural watermark signal applicators, which operate in parallel on segments of the media signal.

29. (Currently amended) A system for parallel watermark embedding comprising:
a media signal pre-processor operable to receive a media signal and divide the media signal into segments for parallel watermark embedding operations based on an analysis of signal characteristics of the media signal for suitability of watermark embedding, the segments representing different perceptual portions within the signal; and
a server for distributing the segments to parallel processors for parallel watermark embedding operations.

30. (Original) The system of claim 29 wherein the segments are prioritized for embedding operations.

31. (Withdrawn) The system of claim 30 wherein the segments are prioritized for embedding operations based on readability of a watermark.

32. (Original) The system of claim 30 wherein the segments are prioritized for embedding operations based on hardware resource constraints.

33. (Original) The system of claim 32 including a load balancer for distributing segments to the parallel processors based on priority.

34. (Original) A batch digital watermark registration and embedding system comprising:
a network interface for receiving ID registration requests, the requests including a list of media signal files and information to be linked with the media signal files via data embedded in the media signal files;

a batch registration loader for creating records in a registration database corresponding to identifiers for each of the media signal files;

a batch registration extractor for reading the registration database and creating an embedder control file, including identifiers, a corresponding list of media signal files, and embedding instructions for controlling embedding of the identifiers in the media signal files; and
a parallel digital watermark embedder for segmenting media signal files into segments and for distributing the segments to parallel processors for performing parallel digital watermark embedding operations on the segments to hide the identifiers in the media signal files.